**Helpful Tips and Information for Completing Part 4 (Paragraphs 7 and 8) of the AP Biology Final Exam**

Mrs. Krouse, AP Biology

**Paragraph 7:** Chi Square Set-Up

1. State your null hypothesis and alternate hypothesis.

Remember, a null hypothesis is a statement that begins with… “There is no statistically significant difference between…”

An alternate hypothesis is a statement that begins with… “There is a statistically significant difference between…” This alternate hypothesis may be written in “If, then” format, but for the purposes of this assignment, we will use the simpler format given.

For this lab, the two things that we are comparing are the expected frequencies of F2 plants with each phenotype predicted using our dihybrid Punnett square between members of the F1 generation and the observed frequencies from the data we collected on the F2 plants we grew. Remember, the four possible phenotypes in the F2 generation are as follows…

* 1. purple stems, green leaves
  2. purple stems, yellow-green leaves
  3. non-purple stems, green leaves
  4. and non-purple stems, yellow-green leaves

1. Identify your observed values for the F2 generation phenotype frequencies (as whole numbers of plants).

You will use the following data collected from Mrs. Krouse’s three AP biology classes as your observed frequencies…

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Plants with Each Phenotype** | | | |  |
| Purple Stem / Green Leaf | Non-Purple (Green) Stem / Green Leaf | Purple Stem/Yellow-Green Leaf | Non-purple Stem (Green) /Yellow-Green Leaf | Total |
| 71 | 44 | 22 | 15 | 152 |

1. Identify your expected values for the F2 generation phenotype frequencies (as whole numbers of plants) and explain how you determined these values using your Punnett square results from Paragraph 6, Part A.

To determine whole numbers of plants expected to have each phenotype, you will need to use your expected decimal frequencies (rounded to the nearest thousandth) from Paragraph 6, Requirement A. To learn how to use these decimal frequencies to find whole numbers of plants, you may want to consult the Chi Square Tutorial and Practice document posted under the Unit 3 (Ecology) heading on the Wiki page.

1. State your calculated chi square value.

*\*\*\*Note: In the appendix of your report, you must show your calculations for the chi square value. You do not need to show calculations for obtaining your expected values, since you already explained how you obtained them in Part C.\*\*\**

Again, you may want to consult the Chi Square Tutorial and Practice document posted under the Unit 3 (Ecology) heading on the Wiki page.

1. State your critical value and explain how you determined this value using a critical values chart.

*\*\*\*Note: In this explanation you must identify the number of degrees of freedom for your data and explain how you determined this number.\*\*\**

Again, you may want to consult the Chi Square Tutorial and Practice document posted under the Unit 3 (Ecology) heading on the Wiki page.

**Paragraph 8:** Chi Square Analysis

1. State whether your calculated chi square value is higher or lower than your critical value.

Again, you may want to consult the Chi Square Tutorial and Practice document posted under the Unit 3 (Ecology) heading on the Wiki page.

1. Explain how your value from Part A allows you to draw conclusions. (Do you reject or support your null hypothesis? Do you reject or support your alternate hypothesis?)

Again, you may want to consult the Chi Square Tutorial and Practice document posted under the Unit 3 (Ecology) heading on the Wiki page.

1. Explain what these conclusions “mean” in the context of this experiment. (Does it seem that our fast plants follow a simple dominant / recessive pattern of inheritance for the traits of stem and leaf color?)

This requirement should be pretty straight forward!